US006036304A

United States Patent [19]

Emanuel

[11] Patent Number: 6,036,304

[45] Date of Patent: Mar. 14, 2000

[54] **INK DELIVERY SYSTEM FLUSHING DEVICE AND METHOD**

[75] Inventor: **Jeffrey V Emanuel**, Vancouver, Wash.

[73] Assignee: **Hewlett-Packard**, Palo Alto, Calif.

[21] Appl. No.: **08/996,012**

[22] Filed: **Dec. 22, 1997**

[51] **Int. Cl.**[7] **B41J 2/17**; B41J 2/175

[52] **U.S. Cl.** **347/84**; 347/86

[58] **Field of Search** 347/84, 28, 85, 347/86, 87, 89, 30, 29; 137/907, 526, 511

[56] **References Cited**

U.S. PATENT DOCUMENTS

4,586,058	4/1986	Yamazaki et al.	347/30
5,691,753	11/1997	Hilton	347/85
5,825,380	10/1998	Ichizawa et al.	347/28

OTHER PUBLICATIONS

Hewlett–Packard Company Patent Application "Replaceable Cartridge, Kit And Method For Flushing Ink From An Inkjet Printer"; S/N 08/785,579; Filed Jan. 21, 1997.

Primary Examiner—N. Le

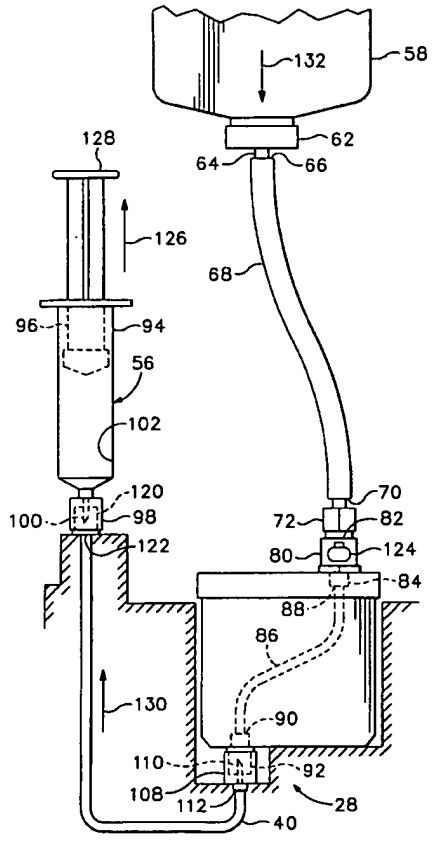
Assistant Examiner—Thinh Nguyen

Attorney, Agent, or Firm—Erik A. Anderson

[57] **ABSTRACT**

A kit and method for flushing an ink delivery system of an inkjet printing device so that different printing composition may be used in the printing device are disclosed. An embodiment of the kit includes a fluid module, a coupler, and a vacuum source. The fluid module stores a quantity of fluid for flushing the ink delivery system. The coupler is fluidly connectable to the fluid module and configured to be fluidly and removeably coupled to a first end of the ink delivery system. The vacuum source is configured to be fluidly and removeably coupled to a second end of the ink delivery system, and further configured to be manually actuable to create a vacuum that draws the fluid from the fluid module into the ink delivery system thereby flushing the ink delivery system. An embodiment of the method includes the steps of fluidly and removeably coupling a fluid module to a first end of the ink delivery system of the printing device and fluidly and removeably coupling a vacuum source to a second end of the ink delivery system of the printing device. The method additionally includes the step of manually drawing a vacuum at the second end of the ink delivery system of the printing device thereby drawing fluid out of the fluid module and into the first end of the ink delivery system, and further thereby drawing ink and the fluid out of the second end of the ink delivery system.

17 Claims, 4 Drawing Sheets



Note indicating cleaning of printhead

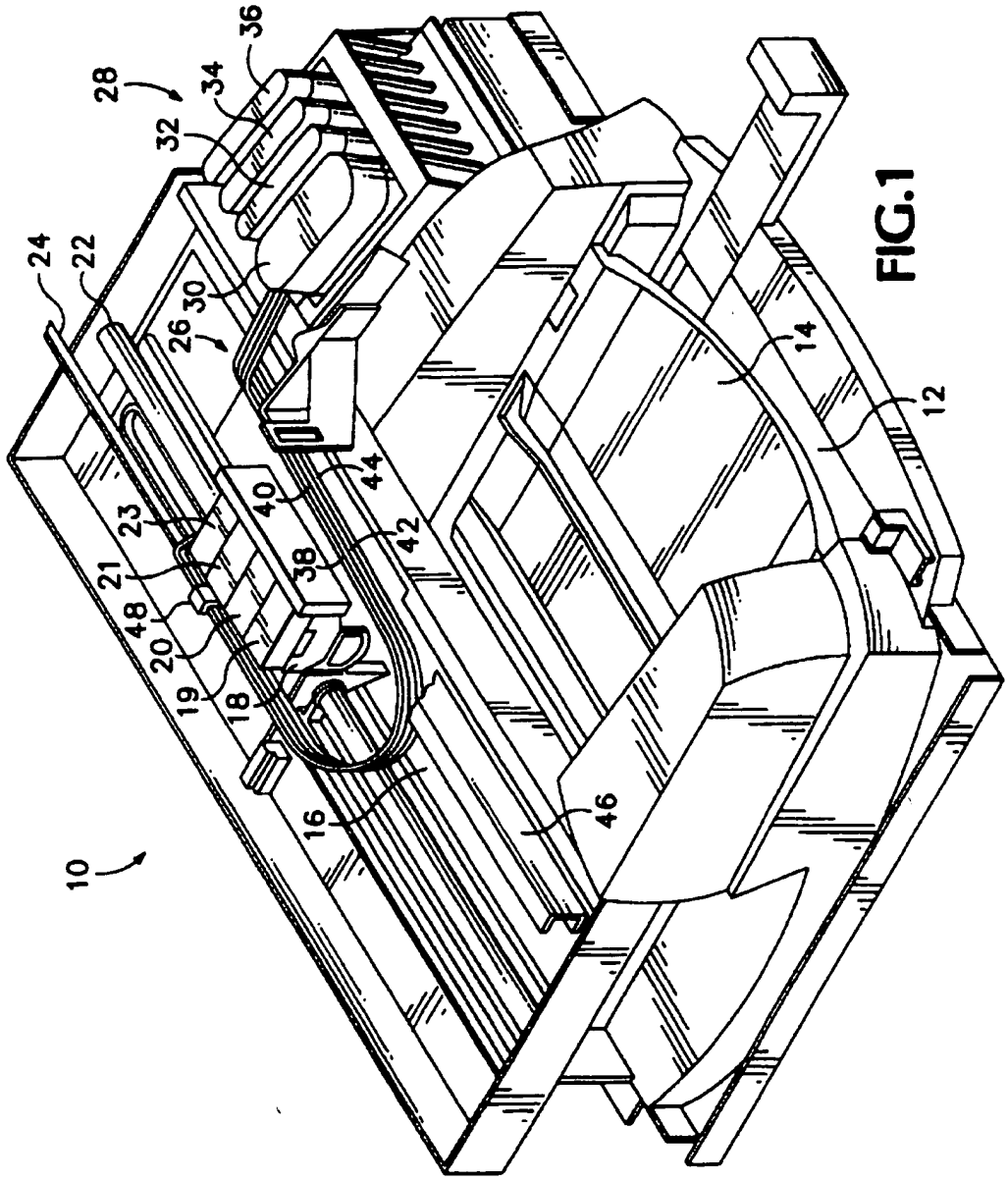


FIG.1

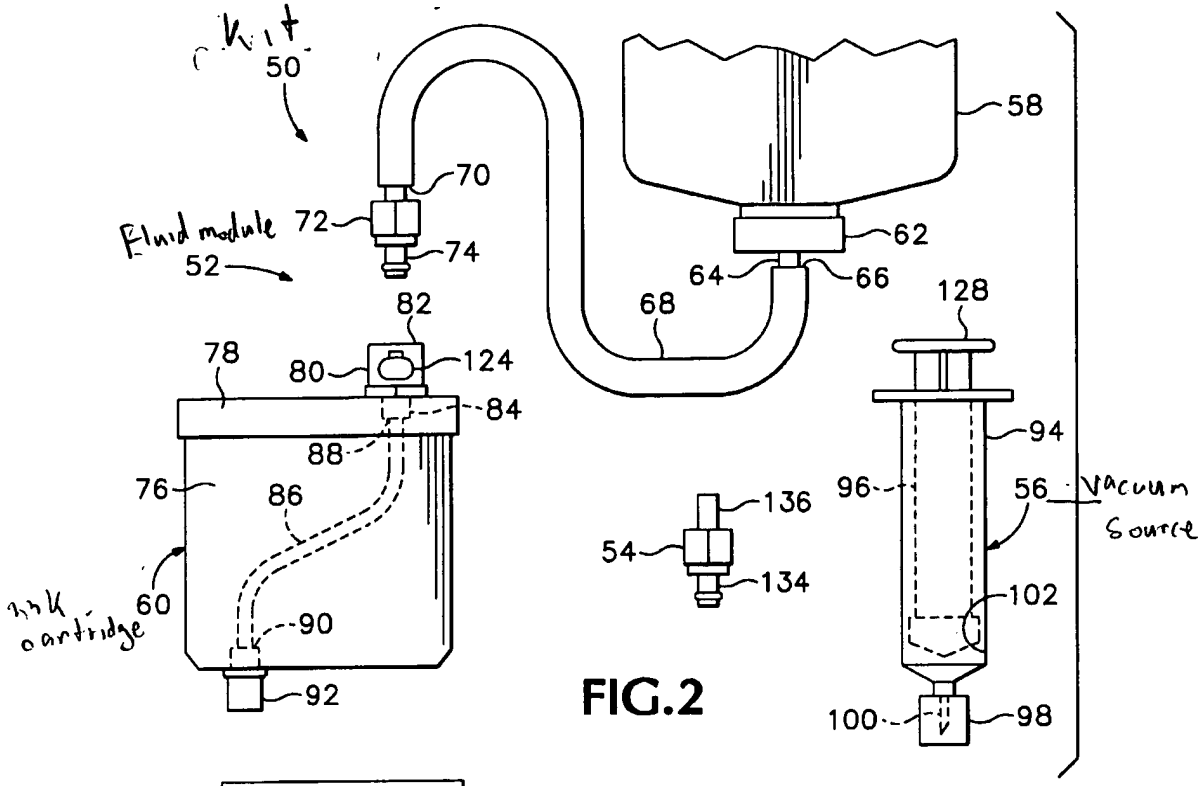

Kit
50
Fluid module
52
70
72
74
58
62
64
66
68
82
78
80
124
84
88
76
86
60
ink cartridge
90
92
128
94
96
56
Vacuum Source
136
54
134
102
100
98

FIG.2

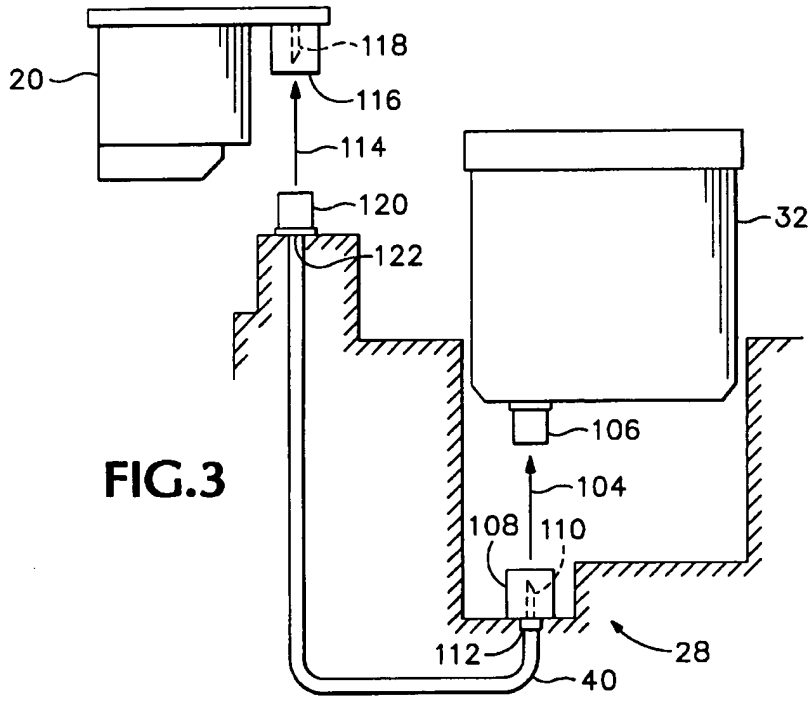

20
118
116
114
120
122
32
106
104
108
110
112
28
40

FIG.3

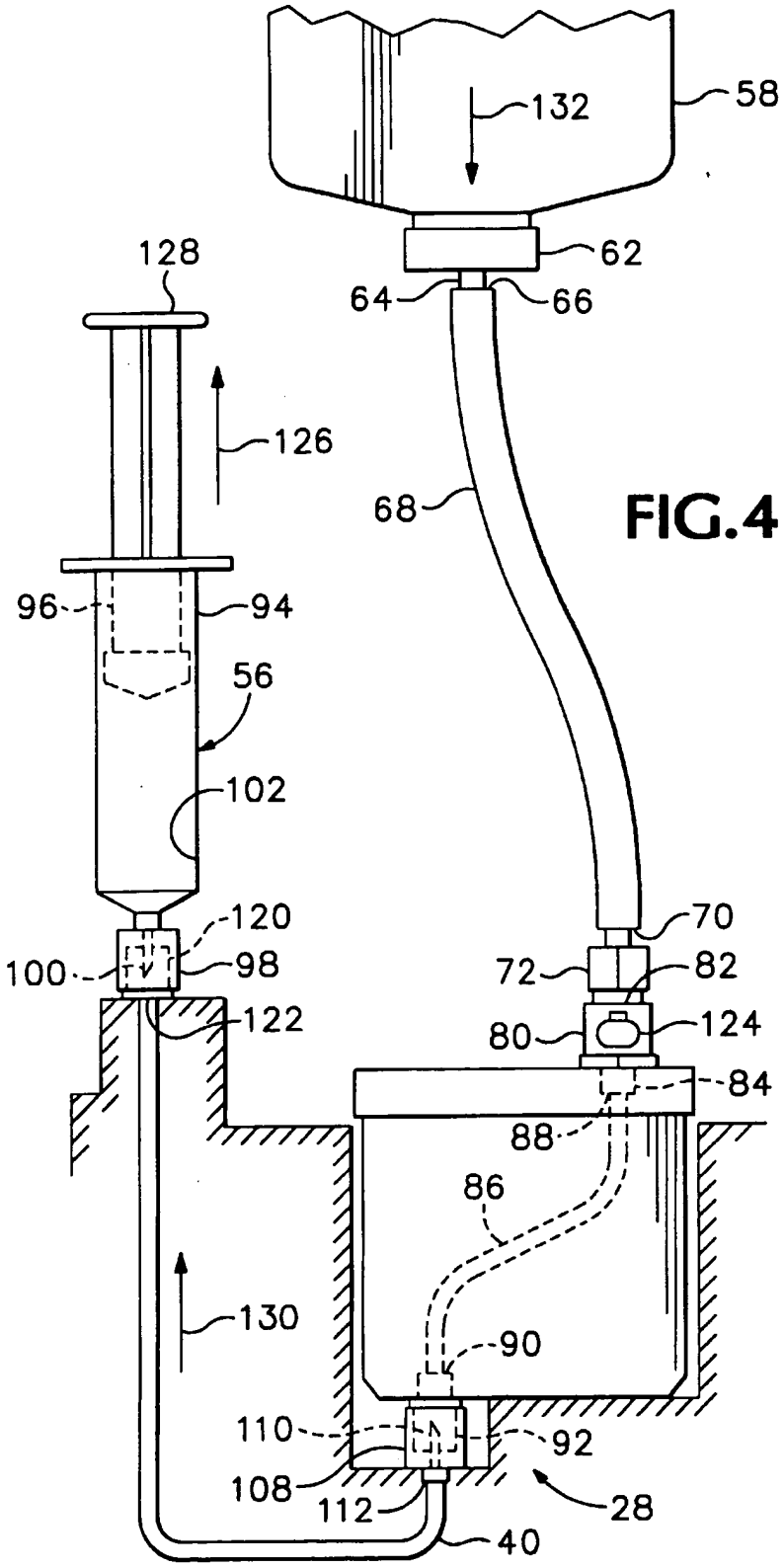

58
132
62
64
66
128
126
68
96
94
56
102
120
100
98
122
70
72
82
80
124
84
88
86
130
90
110
92
108
112
28
40

FIG.4

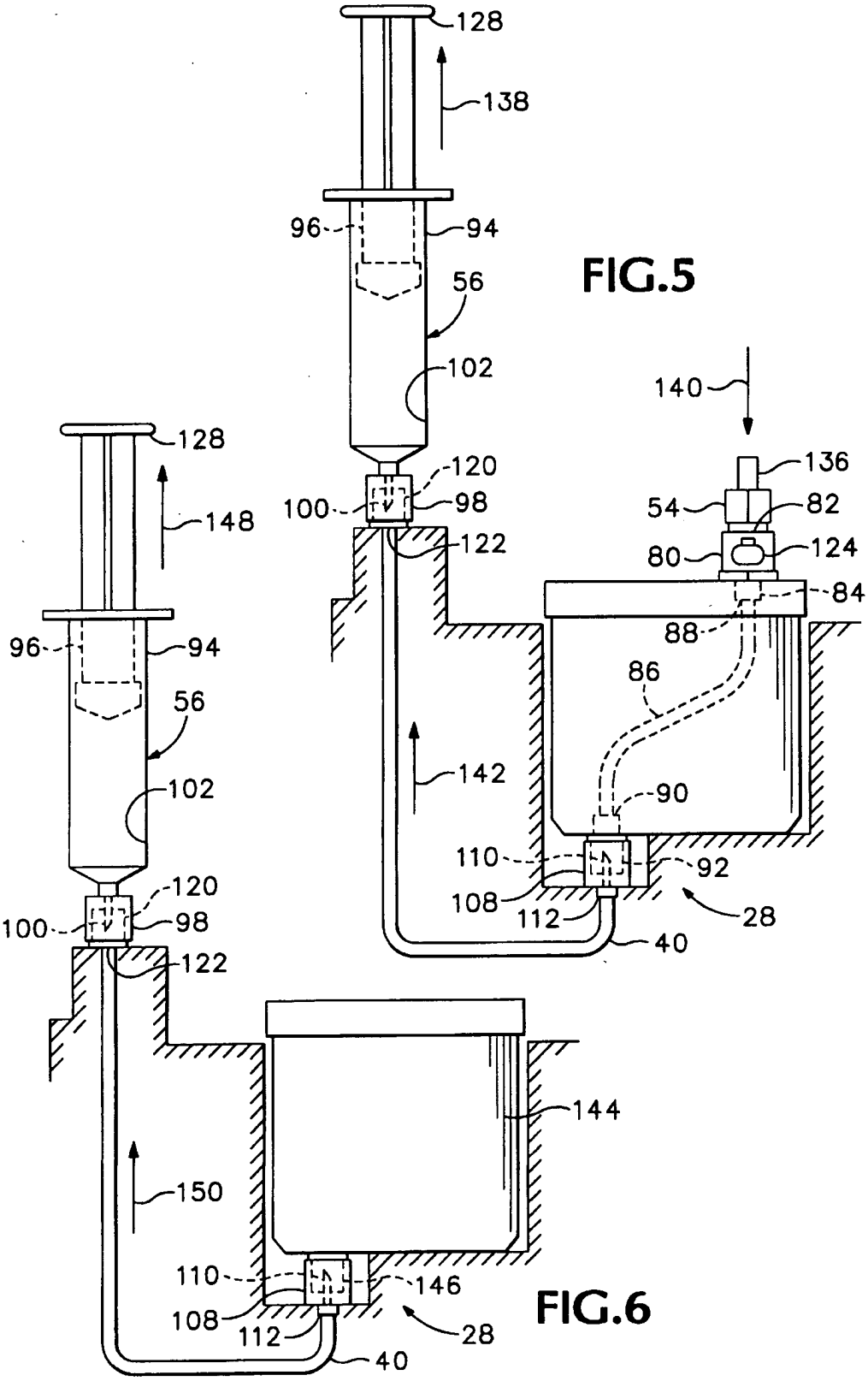

128
138
96
94
56
102
120
100
98
122
140
136
54
82
80
124
84
88
86
142
90
110
92
108
112
28
40
148
144
150
146

FIG.5

FIG.6

INK DELIVERY SYSTEM FLUSHING DEVICE AND METHOD

BACKGROUND AND SUMMARY

The present invention relates to printing devices. More particularly, the present invention relates to a device and a method for flushing an ink delivery system of an inkjet printing device so that different printing composition may be used in the printing device.

Often during printing, it is desirable to change to a different type of ink for a particular printing application. For example, a user may want to switch one or more colors of ink. For inkjet printers that include print cartridges and replaceable ink supply cartridges that supply ink to the print cartridges by an ink delivery system, this cannot simply be done by removing one of the replaceable ink supply cartridges and replacing it with a different color replaceable ink supply cartridge. One reason is that the replacement supply cartridge can become contaminated with ink remaining in the ink delivery system from the previous replaceable ink supply cartridge. In addition, ink from the previous replaceable ink supply cartridge remaining in the ink delivery system will first be printed on a sheet of print media before the different ink from the new replaceable ink supply cartridge, causing the printing device to improperly print the desired text and/or image. Further, a new print cartridge for the different ink can be contaminated by the previous ink remaining in the ink delivery system. A device and method for flushing the ink delivery system is therefore desirable to achieve optimal performance of the printing device when changing one or more of the inks used by the printing device. The present invention is directed at providing such a device and method.

An embodiment of a kit for flushing printing composition from an ink delivery system of a printing device in accordance with the present invention includes a fluid module, a coupler, and a vacuum source. The fluid module is configured to store a quantity of fluid, such as de-ionized water, for flushing the ink delivery system. The coupler is fluidly connectable to the fluid module and configured to be fluidly and removeably coupled to a first end of the ink delivery system. The vacuum source is configured to be fluidly and removeably coupled to a second end of the ink delivery system, and further configured to be manually actuable to create a vacuum that draws the fluid from the fluid module into the ink delivery system, thereby flushing the ink delivery system.

The above-described embodiment of the kit of the present invention may be modified and include the following characteristics as discussed below. The coupler may include a disconnect fitting configured to be fluidly and removeably coupled to the first end of the ink delivery system. The vacuum source may include a syringe. The fluid module may include a replaceable ink supply cartridge filled with fluid for flushing the ink delivery system.

The kit may additionally include a replaceable ink supply container having a first coupler configured to be fluidly and removeably coupled to the first end of the ink delivery system and a second coupler configured to be fluidly and removeably coupled to the fluid module. The kit may be used in a printing device.

An alternative embodiment of a kit in accordance with the present invention includes structure for storing a quantity of fluid used to flush an ink delivery system. The kit also includes structure for fluidly and removeably coupling the structure for storing to a first end of the ink delivery system.

The kit further includes structure configured to be fluidly and removeably coupled to a second end of the ink delivery system for manually drawing a vacuum at the second end of the ink delivery system to cause the fluid in the structure for storing to travel through the ink delivery system and exit the ink delivery system thereby flushing the ink delivery system.

The above-described alternative embodiment of the kit of the present invention may be modified and include the following characteristics as discussed below. The structure for storing may include either a fluid module or a replaceable ink supply container filled with fluid used to flush the ink delivery system. The structure for fluidly connecting may include a disconnect fitting configured to be fluidly and removeably coupled to the first end of the ink delivery system.

The structure for manually drawing a vacuum may include a syringe. The kit may be used in a printing device.

A printing device adapted for switching inks used in an ink delivery system of the printing device in accordance with the present invention includes an ink delivery system, a printing mechanism, a fluid module, a coupler, and a vacuum source. The printing mechanism is coupled to the ink delivery system for printing an image. The fluid module is configured to store a quantity of fluid for flushing the ink delivery system. The coupler is fluidly connectable to the fluid module and configured to be fluidly and removeably coupled to a first end of the ink delivery system. The vacuum source is configured to be fluidly and removeably coupled to a second end of the ink delivery system, and further configured to be manually actuable to create a vacuum that draws the fluid from the fluid module into the ink delivery system thereby flushing the ink delivery system.

The above-described embodiment of the printing device of the present invention may be modified and include the following characteristics as discussed below. The coupler may include a disconnect fitting configured to be fluidly and removeably coupled to the first end of the ink delivery system. The vacuum source may include a syringe. The fluid module may include a replaceable ink supply cartridge filled with fluid for flushing the ink delivery system.

The printing device may further include a replaceable ink supply container having a first coupler configured to be fluidly and removeably coupled to the first end of the ink delivery system and a second coupler configured to be fluidly and removeably coupled to the fluid module.

An embodiment of a method for flushing a printing composition from an ink delivery system of a printing device includes the steps of fluidly and removeably coupling a fluid module to a first end of the ink delivery system of the printing device and fluidly and removeably coupling a vacuum source to a second end of the ink delivery system of the printing device. The method additionally includes the step of manually drawing a vacuum at the second end of the ink delivery system of the printing device thereby drawing fluid out of the fluid module and into the first end of the ink delivery system, and further thereby drawing ink and the fluid out of the second end of the ink delivery system.

The above-described embodiment of the method of the present invention may include the following additional steps, as discussed below. The method may further include the steps of removing the fluid module from the first end of the ink delivery system, and fluidly and removeably coupling the first end of the ink delivery system to a source of air. This aspect of the method additionally includes the step of manually drawing a second vacuum at the second end of the ink delivery system thereby allowing air to enter the first

end of the ink delivery system and thereby drawing any remaining ink and fluid from the second end of the ink delivery system.

The method may further include the steps of disconnecting the first end of the ink delivery system from the source of air, fluidly connecting the first end of the ink delivery system to a supply of ink, and manually drawing a third vacuum at the second end of the ink delivery system to draw ink into the first end of the ink delivery system.

Other objects, advantages, and novel features of the present invention will become apparent from the following detailed description of the invention when considered in conjunction with the accompanying drawings.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. **1** is a perspective view of a printing device in which the present invention may be used to flush an ink delivery system of the printing device so that different inks may be used therein.

FIG. **2** is a diagrammatic view of an embodiment of a kit in accordance with the present invention for flushing an ink delivery system of the printing device of FIG. **1**.

FIG. **3** is a diagrammatic view of the removal of a replaceable ink supply cartridge and a print cartridge from the ink delivery system of the printing device of FIG. **1**.

FIG. **4** is a diagrammatic view of the use of the kit of FIG. **2** to flush the ink delivery system of the printing device of FIG. **1** in accordance with a method of the present invention.

FIG. **5** is a diagrammatic view of the use of the kit of FIG. **2** to further flush the ink delivery system of the printing device of FIG. **1** in accordance with a method of the present invention.

FIG. **6** is a diagrammatic view of a portion of the kit of FIG. **2** and a new replaceable ink supply cartridge with the kit being used to remove any remaining flushing fluid or air from the ink delivery system of the printing device of FIG. **1** and to also help prime the ink delivery system of the printing device of FIG. **1**, both of which are in accordance with a method of the present invention.

DETAILED DESCRIPTION OF THE DRAWINGS

FIG. **1** is a perspective view of an exemplary embodiment of a printing device **10**, here shown as an inkjet printer, in which the present invention may be used. Printer **10** includes an input print media tray **12** for holding an input supply of print media such as paper, transparencies, etc. When a printing operation is initiated, a sheet of print media is fed into printing device **10** using a print media sheet feeder, and then brought around in a U-direction to travel in the opposite direction toward output print media tray **14**. The sheet of print media is stopped in a print zone **16**, and a scanning carriage **18**, containing one or more print cartridges **19**, **20**, **21**, and **23** is then scanned across the sheet for printing a swath of ink thereon. After a single scan or multiple scans, the sheet of print media is then incrementally shifted using a motor and feed rollers (not shown in FIG. **1**) to a next position within print zone **16**, and carriage **18** again scans across the sheet of print media for printing a next swath of ink. When printing on the sheet of print media is complete, the sheet is forwarded to a position above output print media tray **14**, held in that position to ensure the ink is dry, and then released into tray **14**. A scanning mechanism for carriage **18** includes a slide rod **22**, along which carriage **18** slides, and a coded strip **24** which is optically detected by a photo detector (not shown) on carriage **18** for precisely positioning carriage **18**. A stepper motor (not shown in FIG. **1**) is connected to carriage **18** using a drive belt and pulley arrangement and used for transporting carriage **18** across print zone **16**.

Printing device **10** includes a printing composition delivery system **26**, here shown as an ink delivery system, for delivering ink to a printing mechanism that includes print cartridges **19**, **20**, **21**, and **23**. Ink from ink delivery system **26** is supplied by an ink supply station **28** that includes replaceable ink supply cartridges **30**, **32**, **34**, and **36**. For color ink jet printers, there are typically separate replaceable ink supply cartridges for black ink, yellow ink, magenta ink, and cyan ink. Since black ink tends to be depleted most rapidly, black ink supply **30** has a larger capacity than the capacities of the other ink supplies **32**, **34**, and **36**.

A set of four ink supply tubes **38**, **40**, **42**, and **44** carry ink from the four ink supply cartridges **30**, **32**, **34**, and **36** to the four print cartridges **19**, **20**, **21**, and **23**. Tubes **38**, **40**, **42**, and **44** are routed from ink supply station **28** to cartridges **19**, **20**, **21**, and **23** on carriage **18** along C-shaped channel guide **46**, only a portion of which is shown in FIG. **1**, which is open along a side facing print zone **16**. A clamp (not shown) located near ink supply station **28** secures tubes **38**, **40**, **42**, and **44** to guide **46**, yet permits the tubes to move out of guide **46** as needed to follow scanning carriage **18** along slide rod **22**. Tubes **38**, **40**, **42** and **44** may be secured to scanning carriage **18** by a stress relief clamp **48**.

Often during printing, it is desirable to change to a different type of ink for a particular printing application. For example, a user may want to switch one or more of the colors in cartridges **30**, **32**, **34**, and **36**. This cannot simply be done by removing one of these cartridges and replacing it with a different color ink because the replacement cartridge can become contaminated with ink remaining in ink delivery system **26** from the previous replaceable ink supply cartridge. In addition, ink from the previous replaceable ink supply cartridge remaining in the tubes will first be printed on the sheet of print media before the different ink from the new replaceable ink supply cartridge, causing printing device **10** to improperly print the desired text and/or image. Further, a new print cartridge for the different ink can be contaminated by the previous ink remaining in ink delivery system **26**. A device and method for flushing ink delivery system **26** is therefore desirable to achieve optimal performance of printing device **10** when changing one or more of the inks used by printing device **10**. The present invention is directed at providing such a device and method.

An embodiment of a kit **50** in accordance with the present invention for flushing ink from ink delivery system **26** of printing device **10** is shown in FIG. **2**. Kit **50** may be used to flush ink from ink delivery system **26** when one or more inks contained in replaceable ink cartridges **30**, **32**, **34** and **36** are replaced, as more fully discussed below. Kit **50** includes a fluid module **52**, a coupler **54**, and a vacuum source **56**. Fluid module **52** includes a bottle **58** that contains a flushing fluid, such as de-ionized water, and a modified replaceable ink supply cartridge **60**. Coupler **54** is a male quick disconnect fitting that may be purchased from Cole-Parmer under the part no. E-06364-38.

Bottle **58** includes a manually actuable cap **62** that may be threadably secured to bottle **58** by turning cap **62** in a counterclockwise direction and removed from bottle **58** for filling with flushing fluid by manually turning cap **62** in a clockwise direction. Cap **62** includes a fitting **64** that fluidly connects with the flushing fluid contained in bottle **58**. A first end **66** of a flexible tube **68** is fluidly connected to fitting **64**

and a second end **70** of flexible tube **68** is fluidly connected to a male quick disconnect fitting **72**. Quick disconnect fitting **72** may be purchased from Cole-Parmer under the part no. E-06364-38. As can be seen in FIG. **2**, quick disconnect fitting **72** includes a male member **74** for removeably and fluidly connecting to a corresponding female member, as more fully discussed below.

Modified replaceable ink supply cartridge **60** is structurally similar to replaceable ink supply cartridges **30**, **32**, **34**, and **36**. Modified replaceable ink supply cartridge **60** includes a reservoir body **76** and a cap **78** which is secured thereto. A coupler **80** is secured to cap **78** and includes a female member **82** for removeably and fluidly connecting with male member **74** of quick disconnect fitting **72**. Coupler **80** is a female quick disconnect fitting that may be purchased from Cole-Parmer under the part no. E-06364-09. A fitting **84** fluidly connects with a tube **86** inside reservoir body **76** at a first end **88** of tube **86**. A second end **90** of tube **86** fluidly connects to septum coupler **92**. Septum coupler **92** fluidly connects to ink delivery system **26** at ink supply station **28**, as more fully discussed below in connection with FIG. **4**.

As discussed above, kit **50** also includes coupler **54**. In the embodiment of kit **50** shown in FIG. **2**, coupler **54** is the same as quick disconnect fitting **72** and may be purchased under the same part number from the same source. The function and purpose of coupler **54** will be discussed more fully below in connection with FIG. **5**.

Vacuum source **56** of kit **50** includes a syringe **94** which may be purchased from General Tool & Supply under the part no. KAHM10LLASSM. Syringe **94** includes a plunger **96** that may be manually actuated to draw a vacuum, as more fully discussed below. Syringe **94** also includes a coupler **98** and needle **100** for fluidly and removeably coupling ink delivery system **26** to interior cavity **102** of syringe **94**, as more fully discussed below.

A method of using kit **50** in accordance with the present invention is discussed in detail below in connection with FIGS. **3–6**. Replacement of ink in replaceable ink supply cartridge **32** and corresponding print cartridge **20** are illustrated. However, it is to be understood that the illustrated sequence shown in FIGS. **3–6** may be used for replaceable ink supply cartridges **30**, **34**, and **36** and print cartridges **19**, **21**, and **23** as well.

A first step of removing replaceable ink supply cartridge **32** from ink supply station **28** and print cartridge **20** from carriage **18** is diagrammatically shown in FIG. **3**. This is accomplished by manually pulling cartridge **32** in a direction generally indicated by arrow **104** in FIG. **3** so that septum coupler **106** of cartridge **32** is decoupled and removed from coupler **108** of supply station **28**. As can be seen in FIG. **3**, coupler **108** includes a needle **110** that is capable of being fluidly and removeably coupled to septum coupler **106** of cartridge **32**. Needle **110** is fluidly connected to first end **112** of tube **40**. Although not shown, it is to be understood that ink supply station **28** includes couplers and needles for cartridges **30**, **34**, and **36** and tubes **38**, **42**, and **44** as well.

Print cartridge **20** is manually removed from scanning carriage **18** by manually pulling cartridge **20** in a direction generally indicated by arrow **114** in FIG. **3** to remove coupler **116** and needle **118** of cartridge **20** from septum coupler **120** on carriage **18**. Septum coupler **116** is fluidly connected to second end **122** of tube **40**. Although not shown, it is to be understood that carriage **18** includes couplers corresponding to coupler **116** for cartridges **19**, **21**, and **23** and tubes **38**, **42**, and **44** as well.

Next, ink delivery system **26** is flushed with a flushing fluid, as diagrammatically shown in FIG. **4**. Modified replaceable ink supply cartridge **60** is inserted into ink supply station **28** by fluidly and removeably coupling septum coupler **92** of cartridge **60** to coupler **108** by inserting needle **110** into septum coupler **92**. Next, bottle **58** is fluidly and removeably coupled to modified replaceable ink supply cartridge **60** by disposing male member **74** of quick disconnect fitting **72** in female member **82** of coupler **80**. Coupler **80** includes a check valve **124** that is normally closed so that flushing fluid from bottle **58** cannot enter cartridge **60** unless valve **124** is unseated, which occurs when male quick disconnect fitting **72** is connected to female quick disconnect fitting **80**, as described above.

Next, vacuum source **56** is fluidly and removeably coupled to tube **40** of ink delivery system **26** by disposing needle **110** in septum coupler **120** so that coupler **98** surrounds coupler **120**. A vacuum in interior cavity **102** of syringe **94** is created by manually actuating plunger **96** in a generally upward direction as indicated by arrow **126** in FIG. **4**. This vacuum draws ink out of tube **40** as generally indicated by arrow **130**, and also draws flushing fluid out of bottle **58** and into tube **40** via tubes **68** and **86**, as generally indicated by arrow **132**. The ink in tube **40** leaves and enters interior cavity **102** of syringe **94**. The volume of interior cavity **102** may be chosen to be of sufficient size so that all of the ink in tube **40** is drawn out and a portion of flushing fluid in bottle **58** is also drawn into interior cavity **102** after passing through tube **40**. Alternatively, if cavity **102** of syringe **94** fills completely, it may be removed, emptied, and subsequently fluidly and removeably coupled to septum coupler **120** to further draw ink out of and flushing fluid into tube **40**, as illustrated in FIG. **4**.

After tube **40** of ink delivery system **26** has been flushed of ink, the flushing fluid now in tube **40** must be removed. This step of the method in accordance with the present invention for kit **50** is illustrated in FIG. **5**. After bottle **58** has been decoupled by removing male member **74** from female member **82** of coupler **80**, male member **134** of coupler **54** is inserted into female member **82** of coupler **80** which unseats check valve **124**. Coupler **54** includes a stem **136** that is fluidly connected to ambient air. Plunger **96** of syringe **94** is then manually pulled upward in a direction generally indicated by arrow **138** to create a further vacuum in interior cavity **102** thereof. This vacuum draws ambient air into stem **136** through tube **86** into tube **40**, as generally indicated by arrow **140**, and also draws ink out of and air into tube **40**, as generally indicated by arrow **142**. Plunger **96** should be moved sufficiently upward to draw the flushing fluid completely out of tube **40**. If cavity **102** of syringe **94** fills completely, it may be removed, emptied, and subsequently fluidly and removeably recoupled to septum coupler **120** to further draw flushing fluid out of and air into tube **40**, as illustrated in FIG. **5**.

Next, a new replaceable ink supply cartridge **144** containing a different ink than replaceable ink supply cartridge **32** is inserted into ink supply station **28** and fluidly and removeably coupled to tube **40** by disposing needle **110** in septum coupler **146** of cartridge **144** after modified replaceable ink supply cartridge **60** is removed, as diagrammatically shown in FIG. **6**. Any remaining flushing fluid or air in tube **40** may be removed by manually actuating plunger **96** in an upward direction, as generally indicated by arrow **148** in FIG. **6** which causes any such fluid or air to travel out of second end **122** of tube **40** and into interior cavity **102** of syringe **94**, as generally indicated by arrow **150**. This operation also helps prime tube **40** of ink delivery system **26** by drawing printing composition from replaceable ink supply cartridge **144** into tube **40**.

Although not shown, the next step is to remove syringe **94** of vacuum source **56** from septum coupler **120** by removing needle **110** from septum coupler **120**. Finally, a new print cartridge (not shown) which replaces print cartridge **20** is fluidly and removeably coupled to tube **40** of ink delivery system **26** by disposing a needle (not shown) of this cartridge into septum coupler **120**.

Although the invention has been described and illustrated in detail, it is to be clearly understood that the same is intended by way of illustration and example only, and is not to be taken by way of limitation. For example, in an alternative embodiment of kit **50**, bottle **58** is removed altogether and only modified replaceable ink supply cartridge **60** is used. This cartridge is filled with a sufficient quantity of flushing fluid, such as de-ionized water. As another example, an embodiment of a different kit in accordance with the present invention does not use modified replaceable ink supply cartridge **60**, but only uses bottle **58** which contains a different coupler than quick disconnect fitting **72** that allows direct fluid and removeable coupling to coupler **108** of ink supply station **28**, such as a septum coupler. As a further example, a bellows device may be used as a vacuum source instead of syringe **94**. As yet a further example, vacuum source **56** may be fluidly and removeably coupled at first end **112** of tube **40** of ink delivery system **26** at ink supply station **28** or to a modified a replaceable ink supply **60**, and the source of flushing fluid fluidly and removeably coupled to septum coupler **120** on scanning carriage **18** by, for example, a needle. As still yet a further example, the present invention may be used with large-format inkjet printers, such as plotters. The spirit and scope of the invention are to be limited only by the terms of the following claims.

What is claimed is:

1. A kit for flushing printing composition from an ink delivery system of a printing device, the ink delivery system including a first end and a second end, and the ink delivery system being configured to deliver ink from an ink supply cartridge fluidly and removeably coupled to the first end of the ink delivery system to a print cartridge fluidly and removeably coupled to the second end of the ink delivery system, the kit comprising:

a fluid module, the fluid module being configured to store a quantity of fluid for flushing the ink delivery system;

a coupler fluidly connectable to the fluid module and configured to be fluidly and removeably coupled to the first end of the ink delivery system; and

a vacuum source configured to be fluidly and removeably coupled to the second end of the ink delivery system subsequent to decoupling of the print cartridge from the second end of the ink delivery system, and further configured to be manually actuable to create a vacuum that draws the fluid from the fluid module into the ink delivery system thereby flushing the ink delivery system.

2. The kit of claim **1**, wherein the coupler includes a disconnect fitting configured to be fluidly and removeably coupled to the first end of the ink delivery system.

3. The kit of claim **1**, wherein the vacuum source includes a syringe.

4. The kit of claim **1**, wherein the fluid module includes a replaceable ink supply cartridge filled with fluid for flushing the ink delivery system.

5. The kit of claim **1**, further comprising a replaceable ink supply container including a first coupler configured to be fluidly and removeably coupled to the first end of the ink delivery system and a second coupler configured to be fluidly and removeably coupled to the fluid module.

6. A kit for flushing an ink delivery system of a printing device, the ink delivery system including a first end and a second end, and the ink delivery system being configured to deliver ink from an ink supply cartridge fluidly and removeably coupled to the first end of the ink delivery system to a print cartridge fluidly and removeably coupled to the second end of the ink delivery system, the kit comprising:

means for storing a quality of fluid used to flush the ink delivery system;

means for fluidly and removeably coupling the means for storing to the first end of the ink delivery system; and

means configured to be fluidly and removeably coupled to the second end of the ink delivery system subsequent to decoupling of the print cartridge from the second end of the ink delivery system for manually drawing a vacuum at the second end of the ink delivery system to cause the fluid in the means for storing to travel through the ink delivery system and exit the ink delivery system thereby flushing the ink delivery system.

7. The kit of claim **6**, wherein the means for storing includes one of a fluid module and a replaceable ink supply container filled with fluid used to flush the ink delivery system.

8. The kit of claim **6**, wherein the means for fluidly connecting includes a disconnect fitting configured to be fluidly and removeably coupled to the first end of the ink delivery system.

9. The kit of claim **6** wherein the means for manually drawing a vacuum includes a syringe.

10. A printing device, comprising:

an ink delivery system including a first end and a second end;

a printing mechanism fluidly and removeably coupled to the second end of the ink delivery system for printing an image;

a fluid module, the fluid module being configured to store a quantity of fluid for flushing the ink delivery system;

a coupler fluidly connectable to the fluid module and configured to be fluidly and removeably coupled to the first end of the ink delivery system; and

a vacuum source configured to be fluidly and removeably coupled to the second end of the ink delivery system subsequent to decoupling of the printing mechanism from the second end of the ink delivery system, and further configured to be manually actuable to create a vacuum that draws the fluid from the fluid module into the ink delivery system thereby flushing the ink delivery system.

11. The printing device of claim **10**, wherein the coupler includes a disconnect fitting configured to be fluidly and removeably coupled to the first end of the ink delivery system.

12. The printing device of claim **10**, wherein the vacuum source includes a syringe.

13. The printing device of claim **10**, wherein the fluid module includes a replaceable ink supply cartridge filled with fluid for flushing the ink delivery system.

14. The printing device of claim **10**, further comprising a replaceable ink supply container including a first coupler configured to be fluidly and removeably coupled to the first end of the ink delivery system and a second coupler configured to be fluidly and removeably coupled to the fluid module.

15. A method for flushing a printing composition from an ink delivery system of a printing device, the ink delivery system including a first end and a second end, and the ink

delivery system being configured to deliver ink from an ink supply cartridge fluidly and removeably coupled to the first end of the ink delivery system to a print cartridge fluidly and removeably coupled to the second end of the ink delivery system, the method comprising the steps of:

decoupling the print cartridge from the second end of the ink delivery system;

fluidly and removeably coupling a fluid module to the first end of the ink delivery system of the printing device;

fluidly and removeably coupling a vacuum source to the second end of the ink delivery system of the printing device; and

manually drawing a vacuum at the second end of the ink delivery system of the printing device thereby drawing fluid out of the fluid module and into the first end of the ink delivery system and further thereby drawing ink and the fluid out of the second end of the ink delivery system.

16. The method of claim **15**, further comprising the steps of:

removing the fluid module from the first end of the ink delivery system;

fluidly and removeably coupling the first end of the ink delivery system to a source of air; and

manually drawing a second vacuum at the second end of the ink delivery system thereby allowing air to enter the first end of the ink delivery system and thereby drawing any remaining ink and fluid from the second end of the ink delivery system.

17. The method of claim **16**, further comprising the steps of:

disconnecting the first end of the ink delivery system from the source of air;

fluidly connecting the first end of the ink delivery system to a supply of ink; and

manually drawing a third vacuum at the second end of the ink delivery system to draw ink into the first end of the ink delivery system.

* * * * *